[JP,2001-504230,A]

CLAIMS

[Claim(s)]

1. it is a device which has a flat light wave guide -- said light wave guide, A transparent career (40) and said light wave guide from a light wave guide layer (41), it has at least one diffraction element for incorporating an excited ray into said light wave guide layer -- in the supporting surface on said light wave guide layer at least, A firm sealing layer (43) which consists of material which is permeability until it results in the depth of penetration of the EBANE cent community at least is further provided to said excited ray and EBANE cent excited light, At least a light wave guide to a partial area of said introduced excited ray. It has a cave (45) which carried out the opening to the upper part for an analysis specimen, or the cave (6) which was closed by the upper part, flowed out with an inflow channel (2), and was combined with a channel (3), the depth of the cave corresponds to the depth of penetration of said EBANE cent community at least -- a device with which said diffraction element (42) is thoroughly covered with material of said layer (43) in an incorporation field of said excited ray at least here.

2. Device concerning claim 1 with which material of said layer (43) consists of elastic material which carries out seal of said at least one cave (45) or (6) firmly on said light wave guide.

3. Device which requires material of said layer (43) for claim 1 which has self adhesiveness to said light wave guide, or 2.

4. Device concerning claims 1-3 with which material of said layer (43) consists of polysiloxanes.

5. Device which requires the depth of said cave for claims 1-4 which are 10 mm from 0.5 micrometer.

6. Device concerning claims 1-5 which has the 2nd diffraction element for taking out EBANE cent excited light regained by said light wave guide, and the element is preferred and is covered with material of said layer (43) in incorporation <extraction> field of said excited ray at least.

7. Device of claims 1-6 with which 1 to 100 caves were provided.

8. Device concerning claims 1-7 with which material which carries out

absorption in spectral range of excited ray and EBANE cent luminescent light line when there are two or more caves is attached in middle of the cave.
9. Device concerning claims 1-8 whose 1st layer that contacts said light wave guide surface by said layer (43) consisting of two-layer is thing unemitted light in permeability in said excited ray wavelength and luminous wavelength of analyte and whose cover layer which adjoins the layer is thing of beam-of-light absorptivity.
10. each dent part (6) from material of a flow cell (1, 26, 30, 35, 38) A device concerning claims 1-9 from which a refractive index changes in the direction of an excited ray (18) continuously by narrowing material at the time of shift to a specimen solution contained inside.
11. How to use a device concerning claims 1-10 especially in affinity perception analysis, since a target molecule is specified using luminescence art.
12. How to specify a target molecule in an analyte specimen using luminescence art which introduces said analyte specimen in a cave of a device concerning claim 1, is exposed to an excited ray, and measures the light which acts as a late-coming student.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
A measuring device and directions for use for the same This invention relates to the device which consists of a light wave guide, and the device, At least one diffraction element for incorporating an excited ray into a light wave guide layer, It has the sealing layer in which the 2nd on the light wave guide layer became brave, The sealing layer consists of material which is permeability until it results in the depth of penetration of the EBANE cent community at least to the excited ray and EBANE cent excited light in the supporting surface of the field of said introduced excited ray, Said light wave guide has a cave for an analysis specimen in the partial area of said guided excited ray at least, and the depth of the cave supports the depth of penetration of said EBANE cent community at least.
Said diffraction element is thoroughly covered with the material of said

2nd layer in the incorporation field of said excited ray here.
This invention relates to the method of using this device for the method of detecting the molecule which has further the capability in an analyte (substance which should be detected) specimen to carry out EBANE cent excited light.
EBANE cent excited light is made to cause and especially the flat light wave guide for detecting it has been developed in the science field of biochemical analysis in recent years. On an EBANE cent community, even if luminescence of fluorescence etc. takes place, it compares by measuring it and the existence is low density very much when an analyte specimen is contacted for example, quantitive and qualitative specification is possible. The EBANE cent excited light emitted to space at isotopy is measured, for example by suitable measuring devices, such as a photo-diode, a photo-multiplier, or a CCD camera. The method is indicated by WO 95/No. 33197 gazette etc., for example. It is possible also by taking out a part of EBANE cent excited light regained by said light wave guide by a diffraction light element, and measuring it.
This method is stated, for example to WO 95/No. 33198 gazette.
Since the analyte in the specimen which two or more substances mixed intricately is specified in the depth-of-penetration field of said EBANE cent community, And in the affinity perception analysis for combining said analyte molecule with the surface of a light wave guide, a biochemistry cognitive element is fixed by direct or the glue line on the surface of said light wave guide. In order to detect said analyte, said dissolved specimen is contacted with the cognitive element fixed on said light wave guide by the flow which was intermittent or continued.
The problem produced using a measuring cell when contacting said specimen solution and a diffraction incorporation element in it is changing as a result of absorption of a molecule or the combination to up to said incorporation element of the conditions for incorporating said excited ray. Since luminescence or the fluorescence molecule which is not combined is excited by some excited rays which enter into said solution without not entering during said light wave guide, but being refracted by the order of zero, in said specimen, luminescence or the fluorescence which is back comes out deeply, and is excited, the part of them is incorporated into a light wave guide through an incorporation lattice, and it is in worsening

the accuracy and sensitivity of measurement of analyte.
Incorporating from the field where said specimen contacts using the material in which a characteristic demand is not carried out at all about transparency and a refractivity, and distinguishing an element, Said beam of light will be guided, and also a serious obstacle will be brought about, and all may be controlled in the field which contacts a specimen depending on the case, i.e., the field to measure. This problem is stated to WO 97/No. 01087 gazette in detail.
In order to reduce such inconvenience, in WO 97/No. 01087 gazette. It is guided to an opposite direction to an analyte specimen, and the block capacity which does not have a specimen in particular in said cognitive element in the field of a light wave guide incorporation element using the transparent reference solution which does not react is made, It has attached and stated to the back run cell from which certain conditions are acquired by this in the incorporation field of said excited ray. However, although especially an improvement is accepted in this composition for measurement of EBANE cent excited light, it is lacking in the applicability to use every day like the viewpoint of operation facility to diagnostic equipment in which it is comparatively complicated in a technical side, and the application to an intermittence flow is very difficult.
It has stated attaching the passage flow cell made of silicone rubber on a light wave guide with an incorporation lattice and an extraction lattice to analysis science, 62 volumes, No. 18 (1990), and 2012 - 2017 pages. It takes out with an incorporation element and is located in the flow channel region where an element is the same. If this composition is used, measurement will be made even if the degree of optical absorption and a refractivity do not have an alternative reaction with the specific cognitive element in a light wave guide surface. The absorption phenomenon on said surface is disregarded in the case of said analyte (solution which has a refractive index which is different in a coloring matter solution or the case of refractive-index dependence measurement in the case of absorption dependence measurement). Change of the effective refractive index expected in low measurement of such sensitivity by the mode drawn in said light wave guide, If it compares with a big change of the refractive index of the solution supplied, it is insufficient for taking in practice (even if the monolayer of a molecule is absorbed), and as for this, the

obstacle expected in the method that sensitivity is far high when measuring luminescence produced on an EBANE cent community makes marked contrast. Of course, in order to incorporate or to generate the signal of measurement in the case of the refractive-index dependence measuring method based on change of an extraction angle, the actual contact with a specimen and a uniting element is required. Thus, except for the further demand being made by the optical property of construction material, said specimen cell does not almost have undertaking the role which provides a seal to the outflow of a solution as a result of composition of taking out with an incorporation element and arranging an element in the same flow channel.
Therefore, in order to specify analyte based on the measurement of luminescence which takes place on the EBANE cent community of a light wave guide, the device which luminescence by which EBANE cent excitation was carried out through the flat light wave guide can specify with advanced stability and accuracy of measurement is called for.
The measuring device must be simultaneously easy to manufacture, and must be easy also handling.

The following points are found out by that he is surprised until now.
a) the advanced accuracy of measurement is obtained — b good measurement stability is obtained — c advanced sensitometry is obtained -- d The device filled with the analyte molecule, especially the fixed analyte molecule can be stored comparatively for a long time, and, e) the device which consists of a light wave guide and a specimen acceptance portion -- the diffraction element for excited ray incorporation -- few -- also carrying out -- it is constituted so that it may be thoroughly covered in a penetrable layer to the excited ray and EBANE cent excited light in the excited ray incorporation field.
Since it is available in measuring technique, operation of a device is easy.

The incorporation conditions which the excited ray in an incorporation element fixed are brought about from the fact that the dent part is provided in the excited ray propagation lower stream of an incorporation element, and the fact that the diffraction element (incorporation element) is covered in the layer which forms said dent part. On the other hand, the abrupt change of the refractive index of the permeation region of the

excited ray into the material which adjoins a light wave guide decreases substantially. Introduction of an excited ray without a substantial obstacle, and EBANE cent excitation and recovery luminescence within a light wave guide are attained, and it leads to this inducing an usable analysis result under the investigation situation which the optimum cannot often say as the high degree of signal generation, for example by anticipated use. Sudden change-ization of the refractive index acting as an obstacle is also controlled by rounding.
This invention is a thing about the device which has a flat light wave guide which consists of a transparent career (40) and a light wave guide layer (41) first, This light wave guide has at least one diffraction element (42) which incorporates an excited ray into said light wave guide layer, and further on that light wave guide layer, Until it reaches a supporting surface at least upwards at the depth of penetration of an EBANE cent community, In the partial area of an excited ray which has a firm sealing layer (43) which consists of a penetrable material to said excited ray and EBANE cent excited light and to which it was led at least to the analysis specimen, It is the cave (6) which closed if turned to the cave (45) which carried out the opening to the upper part, or the upper part, and was combined by the inflow channel (2) and the outflow channel (3), and the depth of the cave has a thing corresponding to the depth of penetration of the EBANE cent community at least.
Said diffraction element (42) is thoroughly covered with the material of said layer (43) at least in the incorporation <extraction> field of said excited ray here.

It has one or two diffraction elements for taking out a luminescent light line by incorporating an excited ray, has become publicly known [the light wave guide which measures an analyte molecule by said fluorescence means], and is stated to WO 95/No. 33197 gazette and WO 95/No. 33198 gazette. A diffraction element is known considering synchrotron radiation as incorporation and an element to take out. The lattice which can be manufactured by various means is often used for this. For example, such a lattice is arranged at a transparent career or a light wave guide layer, and is stuck to [these / morphosis Naka or after that] by pressure. Such a lattice can be made also by fusion elimination art (laser radiation).

Other production technology includes holography description or the ion transplantation by an ion collision.

Even if there are few layers (43) which form a cave, the supporting surface is permeability to an electromagnetism exposure in an excited ray wavelength area and a luminous wavelength field. It can be made from transparent organic polymers (organic glass), such as polyester, polycarbonate, polyacrylate, polymethacrylate, or a photopolymer, from inorganic materials, such as glass and quartz. This layer (43) is preferably formed from a spring material. Especially the elastic body of polysiloxanes, such as poly dimethylsiloxane which sometimes has self adhesiveness that it is easy to bend softly, is preferred. The material of this layer (43) is publicly known, and acquisition in a commercial scene is possible for it to some extent.

Said layer (43) which has at least one cave can be manufactured by using polish, a press, and cutting art for what could be manufactured with a certain forming process, for example, casting and press technology, from the former, or even half-finished products finished beforehand. This layer (43)

It can be considered as a photopolymerization object as ** and substitution, and can also attach to a light wave guide layer directly by photograph slate art.

If the surface is smooth (surface roughness is a NANOMETORU unit or less than it), in the case of a rigid material, a firm seal will be induced in the state where it pasted up, by self adhesiveness. Generally an elastic body has self adhesiveness. As for surface roughness, in order to stop the scattered reflection of light, it is preferred to make it as low as possible. In such a case, said layer (43) is preferably manufactured as a separate part, it is attached to a light wave guide with firm reel contact, and, in the suitable case on the surface, the cognitive element fixed on the additional thin (namely, <100nm) glue line is arranged.

Said layer (43) is transparent and it consists of single material which does not have luminescence in the excited ray wavelength and luminescent light line wavelength of analyte at least, Or the 1st layer that comprises two layers as substitution and contacts the surface of said light wave guide is transparent, and there is no luminescence in the excited ray wavelength and luminescent light line wavelength of analyte.

The layer covered in contact with it turns into a beam-of-light absorption layer preferably.
the thickness of the 1st layer which touches the surface of a light wave guide in such composition -- at least -- the depth of penetration (44) of an EBANE cent community -- that is, at least about 0.5 micrometer is required. The thickness of the 1st layer is 10 mm from 0.5 micrometer preferably, and also is 0.01 mm to 10 mm.
The depth of said cave corresponds to the depth of penetration of an EBANE cent community at least, and this is about 0.5 micrometer. Said depth is 10 mm from 0.5 micrometer preferably, and, generally is 0.05 to 2 mm still more preferably especially 5 mm in 0.05 still more preferably 10 mm from 0.01.
In order to have advantageous composition, the abrupt change of the refractive index between a light wave guide layer (41) and said layer 43 is avoided, and this is attained by providing a radius of circle in the boundary of said cave in a right-angled supporter at a light wave guide layer. The transition part with the radius of circle which intersects perpendicularly with the surface of the light wave guide in the boundary of a cave means avoiding an exact angle. This radius of circle may be a curved part of a circle, radiation, or a hyperbola, for example. When it bends in said layer (43) and the possible flexible material is used, this radius of circle is automatically formed at the process of pressing that layer in a light wave guide. However, this radius of circle can also be beforehand formed by a forming cycle as substitution. The abrupt change of a refractive index is avoidable also by making it shallow continuously along the propagation of an excited ray, if said cave is made by making it shallow. It is choosing the material which has the refractive index close to the refractive index of an analyte specimen, or same for the material of said layer (43) as other possibilities.
The EBANE cent excited light emitted to space at isotropy can be measured with a suitable measuring device. However, EBANE cent excitation is carried out and the device concerning this invention can have further the 2nd diffraction element for taking out luminescence regained by said light wave guide during a light wave guide. Also as for such a diffraction element, if it tends toward that diffraction element at least also in this case, it is advantageous to the transition part of said layer (43) which takes

out at least, is thoroughly covered with the material of said layer (43) in a field, and intersects perpendicularly with a light wave guide surface that the radius of circle is provided.
As the further improvement of this invention, two or more caves of 4 to 100 are provided preferably, and these can cross and arrange one or more of these along the propagation of an excited ray 2 to 100, or more, for example. For example, two or more caves are sideways arranged a single tier every to the propagation of an excited ray, it begins from a diffraction incorporation element and extends till the upstream point of a diffraction extraction element, and in such a case, it is two to ten pieces preferably, and also two to five caves are provided preferably. the plurality of each diffraction element as other possibilities -- a single tier -- or it provides as one long diffraction element, and said cave is arranged with the propagation of an excited ray at parallel (to namely, longitudinal direction). In this case, 100 pieces or the cave beyond it may exist. The multiple arrays of the 50 caves [two to 20] are especially carried out on the surface of a large flat light wave guide from 2 beyond two or it. The possibility of such quantity multiplication makes it possible to apply the device concerning this invention flexibly according to a actual demand. Such the further deployment is especially preferred to a series and contrastive simultaneous parallel measurement, and when carrying out automation measurement using a still more suitable measuring head, it is preferred.
When there is two or more arrangement of a longitudinal direction parallel to the propagation of said excited ray, in order to control scattered radiation, it is advantageous to provide optical absorption materials, such as coloring matter, paints, soot, a metallic oxide, or metal, along with a cave, for example. Such a material may be attached to the surface of the light wave guide layer of a longitudinal direction which may arrange in the cave of the addition with which a longitudinal direction is provided along the propagation of an excited ray for the purpose, or met the propagation of the excited ray at a sheet shaped. Sheet shaped arrangement is advantageous at the point which can be easily manufactured by coating or vacuum evaporation art. Said absorbent material can be provided also on a diffraction element, and can make an incorporation field free. This device provides the damping material absorbed in the spectral region of

an excited ray (18) and EBANE cent excited light (21) in the both sides of each dent part between a flow cell (1, 26, 30, 35, 38) and a light wave guide (7), Or said attenuation dent part (33) which provided the damping material (27) in the sheet shaped as an invasion layer, or was filled with the damping material can be provided. In a device with the cave opened up, it can arrange similarly.
The device concerning this invention can be applied to various embodiments, and is classified into the embodiment (A) which has an open cave, and the embodiment (B, flow through cell) which has a closing cave.
The embodiment A aforementioned opening dent parts may be shape of what kind of request, such as a square, a rectangle, circular, and an ellipse form, for example. The shape of the device concerning this invention can be equivalent also to the shape of a publicly known small titration board, for example. The geometric arrangement of said dent part may be what kind of arrangement which placed arranging some sequences at the beginning of the year. The device and reference which are displayed and explained by Embodiment B are also applicable like Embodiment A.
Embodiment B It is advantageous that said flow cell is one of them, or covers each extraction element by the device which produces the EBANE cent excited light with at least one extraction element for taking out EBANE cent excitation issue from a light wave guide concerning this invention. As the further deployment about this, or it is one of them, and it is each incorporation element and one, it is converting so that said all dent parts' may be arranged between each extraction elements, it may take out with each incorporation element and specimen material's may be lost from the both sides of an element. This is advantageous at the point that the certain conditions which are not influenced by specimen material are acquired, in both under incorporation of an excited ray and EBANE cent excited light and extraction.
the longitudinal direction which met the propagation of the excited ray as the further deployment -- or it is providing two or more dent parts arranged in the transverse direction in it. If a dent part is arranged in parallel with the propagation of an excited ray, in order to prevent a part of beam of light mixing between the dent part, Between the dent parts in the permeation region of an excited ray and EBANE cent excited light, the material which performs absorption in the spectral range of these

luminescence of the spectral range from ultraviolet rays to infrared rays, etc., for example can be attached, and it is advantageous to it. This can be performed by providing an absorption layer in the middle of a flow cell and a light wave guide. In other examples of an embodiment, the attenuation dent part which could fill the beam-of-light absorption solution, and carried out the opening to the same surface side as said dent part is provided into said flow cell between the propagation of an excited ray, and two or more dent parts arranged at parallel.

In the use in repeated analytical work, as for a flow cell, when it is attached to a light wave guide, it is advantageous to consider it as the flexible material which carries out the seal of said at least one dent part firmly. By this method, even if the further assistance of a seal etc. cannot be found, specimen material can be passed by attaching a flow cell on a light wave guide, without leaking that flow cell.

The further dominance point and effective arrangement serve as a gist of the illustration embodiment which referred to a dependent claim and the following drawings, and it is a perspective view of the device with which the contents produce the EBANE cent excited light in which :drawing 1 has the flow cell attached on the stratified light wave guide.

Drawing 2 is a top view of the device concerning drawing 1.

Drawing 3 shows change of the refractive index in the longitudinal direction in the material which adjoins a light wave guide in the device of drawing 1.

Drawing 4 shows arrangement of the outflow channel which converted what is shown in drawing 2.

Drawing 5 is a device which produces EBANE cent excited light, and a flow cell is attached on a stratified light wave guide, and has three specimen channels and three dent parts which were extended in the meantime, and it shows the thing which has a damping layer provided in a stratified light wave guide.

Drawing 6 is a top view of the device concerning drawing 7.

Drawing 7 is a device which produces EBANE cent excited light, and a flow cell is attached on a stratified light wave guide, and has three specimen channels and three dent parts which were extended in the meantime, and it shows the thing which has a damping layer provided for between [of two each / every] dent parts.

Drawing 8 and drawing 9 show arrangement of the several-kinds dent part in a flow cell for coincidence measurement.
Drawing 10 shows the device which has a cave which carries out an opening to the upper part.
Drawing 1 is a perspective view of the flow cell 1 which consists of flexible materials. The flow cell 1 shown in this drawing 1 is visible at least, and is made from a flexible polymer material which has penetrable elasticity to electromagnetic radiation in a near infrared region. As this polymer material, poly dimethylsiloxane, such as the sill guard 182 and the sill guard 184 (Dow Corning), or the polymer material which consists of RTVE series (a room temperature cross-linking elastomer, VAKKA KEMITORONIKU) is used preferably. According to the fact that a flow cell can be easily manufactured by a die-forming process, it compares not only in repeated use, and once, even if it is use of a limitation, it is realized economically. This flow cell 1 has an inflow channel as the 1st specimen channel, and the outflow channel 3 which introduces and discharges a specimen solution as the 2nd specimen channels, respectively, and these functions have compatibility. It flowed out with said inflow channel 2, and the channel 3 is the middle of the upper surface 4 and the dent part 6, and the surface 4 carried out the gestalt of the flow channel attached to the supporting surface 5 of an opposite hand, and it is prolonged. The opening of said dent part 6 is carried out toward said supporting surface 5.
And it flowed out with said inflow channel 2, and has extended between the channels 3.

In drawing 1, said flow cell 1 is attached by self adhesive force on for example, TiO_2 or the Ta_2O_5 light wave guide 7 of make. It is changed so that the flow cell 1 may be fixed on a light wave guide, using adhesives, such as a charge of a transparent adhesive material, for example as other methods. As a result, since the seal of the dent part 6 is carried out firmly, the flow of the solution containing the specimen material which should be inspected will flow through the inflow channel 2, the dent part 6, and the outflow channel 3. Since the construction material of said flow cell 1 is elasticity, it adapts itself to the surface structure of the light wave guide 7 flexibly, and a seal is formed, without requiring a seal element besides the result.

The comparatively thin light wave guide 7 is attached to the mechanically stable base 8 made, for example from glass, polycarbonate, etc., and is fixed firmly. In the example of an embodiment shown in drawing 1, the flow cell 1, the light wave guide 7, and the base 8 are carrying out the shape of a cubic shape which became flat-tapped [a side boundary] mutually. As this modification, an oval, positive, or an irregular polyhedron can be made into other geometrical shape, for example, and a thing with a parabolic edge section is also contained in this.
In the about two inflow channel end face 9 and the middle of the inflow channel 2 as a dispersive incorporation element of the analysis apparatus 13 in which the light wave guide 7 shown in drawing 1 is formed of the flow cell 1 with dent part 6 direction, sideways, The incorporation lattice 10 extended between the two sides 11 and 12 of being parallel to the dent part 6, and the stratified light wave guide 7 and the base 8 are included. In the example of an embodiment shown in drawing 1, the extraction lattice 15 is included as a dispersive extraction element, it flowed out with the outflow channel 3, said stratified light wave guide 7 has been arranged in the middle of the side edge 14, and said incorporation lattice 10 is prolonged in parallel.
As this modification, two or more incorporation lattice and/or two or more extraction lattices are provided, and these are used as an incorporation element and an extraction element, respectively. An extraction element can be abolished when detecting a part of EBANE cent excitation light waves scattered on space at isotropy.
Drawing 2 is a top view of the upper surface 4 of said flow cell 1. Since the dent part 6 took out with the incorporation lattice 10, it extended in the middle of the lattice 15 and those ends have kept the gap so that drawing 2 may show, it takes out with the incorporation lattice 10 and the specimen solution in which the both sides of the lattice 15 flow through the inflow channel 2, the dent part 6, and the outflow channel 3 does not contact.
The both sides of the inflow channel 2 and the outflow channel 3 are circular, or are doing the opening to said dent part 6 in the tap hole 17 with polygonal (not shown) sectional shape as the input 16 and the 2nd specimen mouth as the 1st specimen mouth. In the example of an embodiment shown in drawing 2, said input 16 and the tap hole 17, It is arranged directly, and flows

into the both ends of said dent part 6 which counters the incorporation lattice 10 and the extraction lattice 15, respectively with said inflow channel 2, and the channel 3 is vertically formed in them to said dent part 6 within the flow cell 1. In order to reduce the flow resistance in the input 16 and the tap hole 17 by vertical disposition as this modification, it flows out with said inflow channel 2, and the channel 3 is aslant arranged to the dent part 6.

Drawing 3 is a perspective view of the device which has arranged the incorporation lattice 10 neighborhood towards the excited ray 18 from the light source (it does not display on drawing 5) for producing EBANE cent excited light, It has the specimen solution 19 which passes the flow cell 1, the stratified light wave guide 7 attached to the base 8 and the inflow channel 2, the dent part 6, and the outflow channel 3. Said specimen solution 19 contains the illuminant child 20 (it displays in ** type) who should analyze, for example.

said excited ray 18 irradiated by the incorporation lattice 10 is incorporated into the light wave guide 7 by refraction -- introduction -- wave-profile -- it takes out by voice and is spread in the direction of the lattice 15. In the field of the dent part 6 of the flow cell 1 which carried out the opening toward the light wave guide 7, the illuminant child 20 contained in said specimen solution 19 is excited by the portion which the beam of light which enters into [what is called the EBANE cent part of the excited ray 18], i.e., the material which adjoins the light wave guide 7, decreases exponentially, and emits light. The portion of the flow cell 1 which adjoins the light wave guide 7, To the excited ray 18 and a luminescent light line, as a result of being permeability, said excited ray 18 drawn in the light wave guide 7, The portion which the beam of light of the dent part 6 is decreasing in the shape of an EBANE cent is reached, the molecule 20 is excited, and some of the beam of light which emitted light is regained by said light wave guide 7 in the state of the EBANE cent excited light 21. As for a result with a transparent portion of the flow cell 1 which adjoins the light wave guide 7, both the excited ray 18 which was incorporated into the light wave guide 7 and spread, and the EBANE cent excited light 21 are led to the extraction lattice 15.

Said excited ray 18 is separated from the EBANE cent excited light 21 in which pitch was usually displaced in spatial position by the dispersing

function of the extraction lattice 15. The sensing device 21 is formed in the propagation of the EBANE cent excited light 21.
This can analyze density, the spectrum distribution of the luminescence, etc.

It is ″X″ on the horizontal axis 24 about the refractive index further expressed with ″n″ to drawing 3 on the vertical axis 23.
It is displaying as a function of the position of the penetrant portion longitudinal direction of the EBANE cent excited light 21 come out of and displayed. Each position of each longitudinal direction of the flow cell 1 has led to the horizontal axis 24 by the dotted line. In the flow cell 1 exterior, it is n= 1.0 in the refractive index in the atmosphere. Between the end face 9 which counters the inflow channel 2, and the end face of the dent part 6 of the side which counters the end face 9, a refractive index is n= 1.4 and this is equivalent to the refractive index of the construction material with which the flow cell 1 is manufactured. As a result, in a portion with the incorporation lattice 10, a refractive index will be constant and the output ray 18 will be incorporated at a certain fixed angle regardless of the characteristic of the specimen solution 19. Between the end face 14 which similarly adjoins the outflow channel 3, and the end face of the dent part 6 of the side which counters the end face 14, similarly a refractive index is n= 1.4, and this is equivalent to the refractive index of the construction material with which the flow cell 1 is manufactured, and becomes certain refractive-index conditions in a portion with the incorporation lattice 10 also here. In the example of an embodiment which a refractive index is decided by the optical property of said specimen solution 19, and is shown in drawing 5 in a field with the dent part 6, this n is 1.33.
Since the abrupt change of the refractive index of the place where incorporation to the light wave guide 7 of the excited ray 18 does not have reflection mostly, and the EBANE cent part of the excited ray 18 goes into a specimen solution in the composition shown in drawing 3 is comparatively small, Most portion of the output ray 18 is introduced and the EBANE cent excited light 21 is obtained at a rate high as a result. Since the abrupt change of the refractive index of dent part 6 terminal part which counters the extraction lattice 15 is comparatively small, collapse of the EBANE

cent excited light 21 is also comparatively small, and is taken out as a result, and the high signal input as the whole is obtained at the time of the deviation in the lattice 15. As a result, even if it obtains with illuminant child 20 densities of the specimen solution 19 and is low, it becomes possible to detect.
The position from which each longitudinal direction to the flow cell 1 differs is expressed on the horizontal axis 24 as the dotted line.
The flow cell shown in drawing 4 as this modification starts near the input 16 which said dent part 6 incorporated, took out with the lattice 10, and has been arranged in the middle of the lattice 15, It extends to the middle of the end face 14 near the extraction lattice 15 and its extraction lattice 15, the dent part 6 takes out, and the lattice 15 is covered. Also in this arrangement, the high degree of incorporation nectar of the excited ray 18 is obtained, and this is the most important thing for EBANE cent excited light 21 density. If it compares with the neighborhood of the incorporation lattice 10, the optical obstacle of a certain kind in the field of the extraction lattice 15 is not so important.
Drawing 5 is added to the light wave guide 7 which was attached to the base 8 and which takes out with the incorporation lattice 10 and has the lattice 15, The simultaneous analysis apparatus 25 with the outflow channel 3 of three inflow channels [2 or 3] and three dent parts which flow out with the inflow channel 2, and are prolonged between the channels 3, respectively is shown. As this modification, said light wave guide 7 is made into zonal structure, and there are some which are arranged by the belt of the stratified light wave guide 7 facing the dent part 6.
The damping layer 27 which carries out absorption to the both sides of each dent part 6 in the spectral region of the excited ray 18 and the EBANE cent excited light 21 is formed in the light wave guide 7, Especially the EBANE cent excited light 21 mixed in other two dent parts 6 from the one dent part 6, and it has avoided that the fault of measurement arises by that cause. The damping layer 27 which forms the boundary of the longitudinal direction side of each dent part 6 absorbs strongly the portion of the beam of light emitted from the field of the dent part 6. As a result, since all are classified into the transverse direction in spatial position to the direction of propagation when taken out from the extraction lattice 15, the EBANE cent excited light 21 can be simultaneously inspected using the

three dent parts 6, even if it is the different specimen solution 19.
Drawing 6 is light wave guide 7 top view of the simultaneous analysis apparatus 25 displayed on drawing 5. Said damping layer 27 which takes out with the incorporation lattice 10, and is fundamentally continued and prolonged for light wave guide 7 overall width between the lattices 15 is classified by the guide area 28 arranged in parallel with the sides 11 and 12 with a right-angled basal plane. According to this arrangement, the size of said guide area 28 is equivalent to the size of the side of the dent part 6 suitable for the stratified light wave guide 7 which adjoins it and which was attached to the flow cell 26 shown in drawing 7. As a result, without big beam-of-light mixing taking place, among two or more of the guide areas 28 (i.e., between the specimen solutions 19 which pass a dent part), the excited ray 18 incorporated into the light wave guide 7 in the incorporation lattice 10 takes out the inside of the guide area 28 to a longitudinal direction, and is led to the lattice 15.
There are some which were prolonged until said damping layer 27 incorporated, and it extended through the lattice 10 and extraction lattice 15 top, it incorporated the guide area 28 similarly as modification over the example of an embodiment displayed on drawing 5 and drawing 6 and it resulted in the lattice 10 and the extraction lattice 15.
The outside where means by which drawing 7 is a perspective view of the simultaneous analysis apparatus 29 concerning another example of an embodiment, and the design avoids mixing differ is the same as said simultaneous analysis apparatus 25.
Therefore, only the changing part is explained. This simultaneous analysis apparatus 29 in the middle of the three inflow channels 2 each, the outflow channel 3, and the dent part 6. In the attenuation inflow channel 31, the attenuation outflow channel 32, and drawing 9, an opening is carried out toward the stratified light wave guide 7, respectively, and the flow cell 30 which has an attenuation dent part which is behind the dent part 6 is attached. In drawing 7, the attenuation component is shown by black and the solution which consists of coloring matter for example, it carries out absorption in the spectral region of the excited ray 18 and the EBANE cent excited light 21 is filled by said attenuation inflow channel 31, the attenuation outflow channel 32, and the attenuation dent part.
As modification of the example of an embodiment shown in drawing 7, said

attenuation dent part 33 incorporates and it is extended even in the lattice 10 and the extraction lattice 15, The position of said attenuation inflow channel 31 and the attenuation outflow channel 32 moves by this, and superposition of the EBANE cent excited light 21 generated in the dent part 6 which is different especially in the field of said extraction lattice 15 as a result is kept from taking place.
Furthermore drawing 8 has the flow cell 35, it is a section of another simultaneous analysis apparatus 34, and this section is regarded as the light wave guide 7 in parallel. Said flow cell 35 has some dent parts 36, these take out with the incorporation lattice 10, and the propagation of the excited ray 18 incorporated with the incorporation lattice 10 uniformly between the lattices 15 has the advantageous point arranged sideways. In this simultaneous analysis apparatus 34, it is possible to inspect simultaneously the different specimen solution 19 introduced into the dent part 36 using the EBANE cent excited light 21 like an old thing, and predetermined superposition of the various portions of the EBANE cent excited light 21 is obtained here.
Drawing 9 is a flat-surface sectional view of the flow cell 38 of another simultaneous analysis apparatus 37, and shows a field parallel to the stratified light wave guide 7. It has some dent parts 39, and each incorporates these in parallel with mutual among the sides 11 and 12, they take out this flow cell 38 with the lattice 10, between the lattices 15, only fixed length is prolonged and it is arranged. In the example of an embodiment shown in drawing 9, the length of each dent part 39 is taken out with the incorporation lattice 10, and is set to about 1/5 of the length between the lattices 15. This dent part 39 is divided into three groups, and each group is prolonged in the propagation and rectangular directions of the excited light 18 which were incorporated into the stratified light wave guide 7 in the incorporation lattice 10, It takes out with the incorporation lattice 10, the circumference group near the lattice 15 is stationed similarly, and the middle group's dent part 39 is arranged at the crevice between said circumference groups who moved to the transverse direction from them. The simultaneous analysis apparatus 37 shown in drawing 9 is effective especially when inspecting the specimen solution 19 of a large number which have the EBANE cent excited light 21 of the density which can enough be detected also when a reaction occurs between

comparatively short distance.

Drawing 10 shows the example of an embodiment with the cave which carries out an opening towards the upper part. The self adhesiveness layer (43) which consists of poly dimethylsiloxane is attached to the transparent career (40) which has the light wave guide layer 41, an incorporation lattice (42), and an extraction lattice. A circular cave is provided in the upper part at said layer (43), and an analyte specimen can be filled here.

In the example of an embodiment of the simultaneous analysis apparatus 34 and 37 shown especially in drawing 8 and drawing 9. instead of [of the incorporation lattice 15] -- or it -- in addition, it is preferred to establish the condensing means for the EBANE cent excited light 21 emitted to free space, and it is possible to analyze said EBANE cent excited light separately in each dent parts 36 and 39.

As for drawing 5 and drawing 6, drawing 7, drawing 8, and the flow cells 26, 30, 35, and 38 shown in drawing 9, it is preferred to manufacture with the same material as the flow cell 1 displayed and explained by drawing 1. When said flow cells 1, 26, 30, 35, and 38 are manufactured by a die-forming means, even if said dent parts 6, 36, and 39 can manufacture various kinds of geometric configurations by a simple method, and face them especially use of a limitation once as a result and they are the things of a comparatively complicated size and directivity, they may be formed economically. The marker molecule needed in order to detect the cognitive element which fixes the analyte which should be detected to a specific reaction or the back in relation to this, If it attaches to the light wave guide 7 a priori when manufacturing EBANE cent excited light 21 generator which has the flow cells 1, 26, 30, 35, and 38, the advantageous point will also be mentioned from a viewpoint of a low manufacturing cost. These marker molecules are protected by the flow cells 1, 26, 30, 35, and 38 to pile up.

In order that many fluorescence by which EBANE cent excited light is carried out in said flow cells 1, 26, 30, and 35 and 38 may avoid lapping with the EBANE cent excited light 21 of an analysis target's specimen solution 19, As for all the flow cells 1, 26, 30, 35, and 38, it is preferred to be manufactured from material without parenchyma top fluorescence. As for the flow cells 1, 26, 30, 35, and 38, in order to prevent incorporating an

environment light line into the stratified light wave guide 7, for example on the end faces 9 and 14, the sides 11 and 12, and the upper surface 4, it is preferred that it is a thing of beam-of-light absorptivity.
In relation to this, the coloring matter which carries out absorption as this modification in the spectral region used, It may attach to the inner surface of the flow cells 1, 26, 30, 35, and 38 except the field which adjoins the stratified light wave guide 7 directly by a manufacturing process, and it may improve so that it may be made to permeate by the EBANE cent part and the EBANE cent excited light 21 of said excited ray 18. As a result, incorporation of all stray light is avoided on parenchyma, and the same effect is done so even if the surfaces 4, 9, 11, 12, and 14 it turned [surfaces] to the exterior of the flow cells 1, 26, 30, 35, and 38 even if receive damage.
The device concerning this invention can manufacture a flat light wave guide and the layer (43) formed beforehand by one, and adhesives will be used for it if necessary. Before these are made into one, the molecule of the target which should be inspected can be fixed to a light wave guide layer, and/or a light absorption layer can be attached to said light wave guide layer or the layer formed beforehand. As other manufacture techniques, photosensitive resin and photograph slate art are used, for example, and there is art of manufacturing said layer (43) to a light wave guide directly.
The device concerning this invention is suitable for specifying a target molecule using the luminescence excitation operations of the analyte specimen usually especially used in examples, such as affinity perception analysis. This method is attained by the means [say / measuring the luminescent light line which said cave is filled with an analyte specimen, and an excited ray is incorporated, for example, is produced in /, such as fluorescence radiation, / it] publicly known so to speak. The device concerning this invention to which the target molecule which should be specified was especially fixed in said affinity perception analysis, It is advantageous at the point which can measure using the specimen which could store comparatively for a long time, produced luminescence under the neutral solution or the analyte solution if required, and were further collected by identity operation when it was a request.
As said excited ray, it is advantageous to use a laser beam.
Further especially in affinity perception analysis, since a target molecule

is specified using luminescence art, this invention relates also to the method of using the device concerning this invention.
This invention relates also to the method of specifying the target molecule in an analyte specimen using luminescence art, further, said analyte specimen is introduced into the cave of the device concerning this invention, and is exposed to an excited ray after that here, and luminescence produced by it is measured.

DRAWINGS

[Drawing 1]

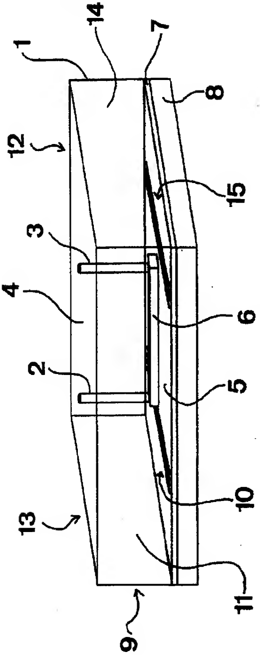

Fig. 1

[Drawing 2]

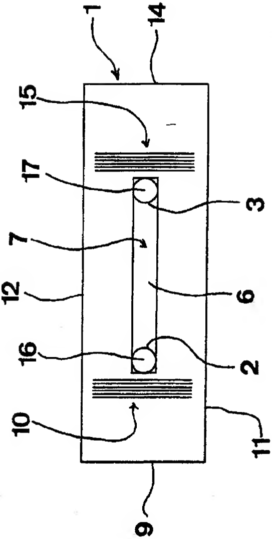

Fig. 2

[Drawing 3]

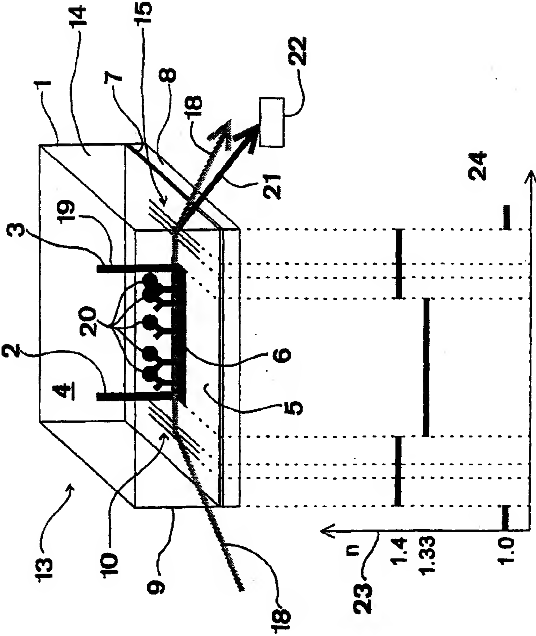

Fig. 3

[Drawing 4]

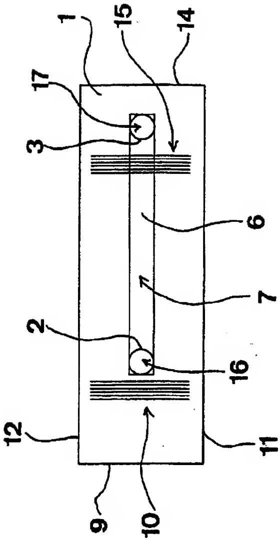

Fig. 4

[Drawing 5]

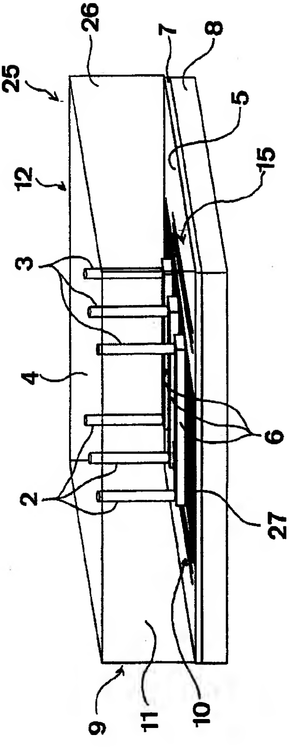

Fig. 5

[Drawing 6]

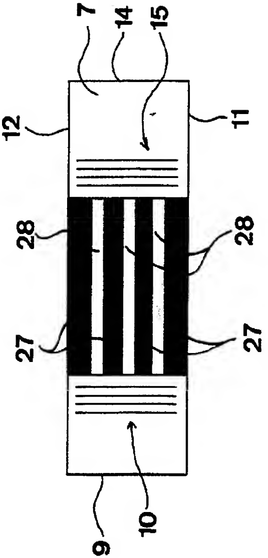

Fig. 6

[Drawing 7]

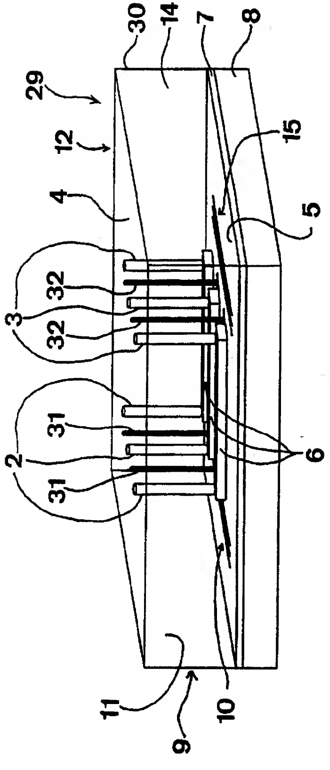

Fig. 7

[Drawing 8]

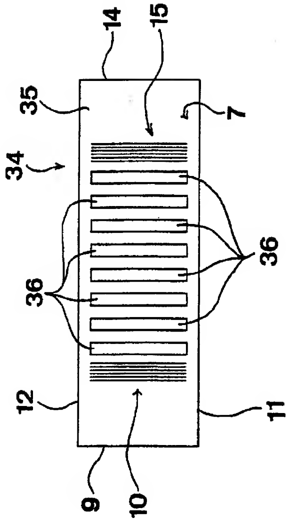

Fig. 8

[Drawing 9]

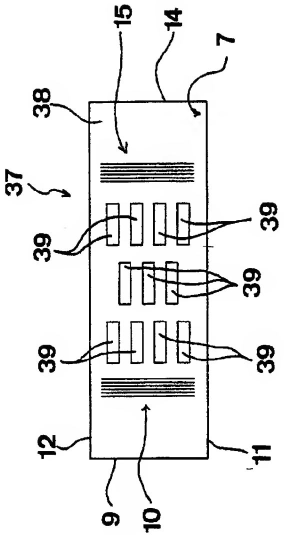

Fig. 9

[Drawing 10]

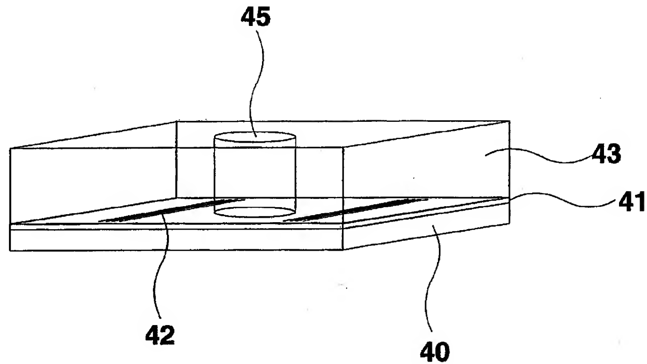

Fig. 10